

THE TOOLS OF TELEVISION

CHAPTER XI

THE TOOLS OF TELEVISION

Intricate tools are necessary for creating the visual image for television. Use of these tools calls for complete and thorough understanding by station personnel. This chapter will deal briefly with these tools, their use and functions.

THE TELEVISION CAMERA

This is the most important single tool in television. Many effects can be created with the television camera, but knowledge of its basic component parts is essential for proper use and understanding of this flexible instrument. These basic component parts are:

- Camera Proper — This includes the tube, lenses and associated circuits;
- View Finder — Located at the rear of the camera, electronically controlled;
- Camera Mount — This is the tripod or pedestal, mounted on casters, with a suitable pan head.

1. Camera Proper

Three lenses, mounted on a turret, are located on the front of the camera, which enables the cameraman to rotate any of the three lenses into operating position. Also, on the front of the camera is the tally light — a red pilot light that indicates to all personnel on the set which camera is picking up the scene. On the right side of the camera is found the focus knob used by the cameraman to bring the picture into sharp focus. Usually, it will be necessary to change the focus each time a lens is switched.

With each camera there is a control unit, normally located in the control room, with a monitor screen showing the picture on the camera.

2. View Finder

The electronic view finder is situated on the back of the camera and usually carries a hood to block out incidental light. Below this will be found the handle for rotating the lens turret and a tally light which serves to inform the cameraman when the picture is being taken from his camera by the director.

3. Camera Mount

This includes the pan head, a device on which the entire camera is mounted and by which the camera can be moved on its mounting. The most popular type of pan head is a friction head which uses the friction between two surfaces to slow down and smooth out the movement of the camera. This friction head has two tension controls: One to adjust tension or friction on the panning movement, that is, from side to side; the other, to adjust tension on the tilting movement, that is, up and down.

The long handle attached to the pan head is used to pan or tilt the camera and the mounting beneath the pan head is the tripod to which is attached a movable dolly.

THE TELEVISION CAMERA LENS

Familiarity with the characteristics of television camera lenses is important to television personnel. Television lenses have certain characteristics and personnel should un-

THE TELEVISION CAMERA

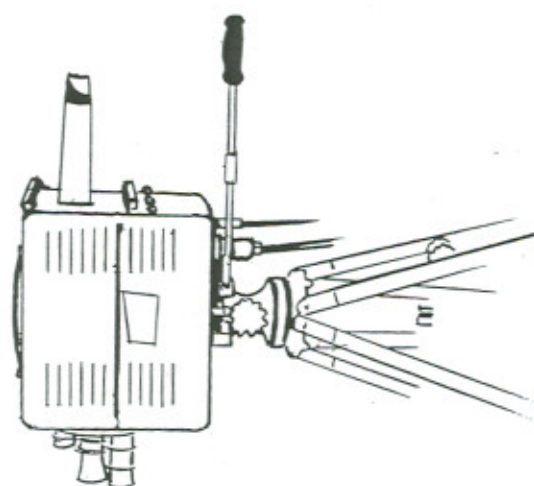
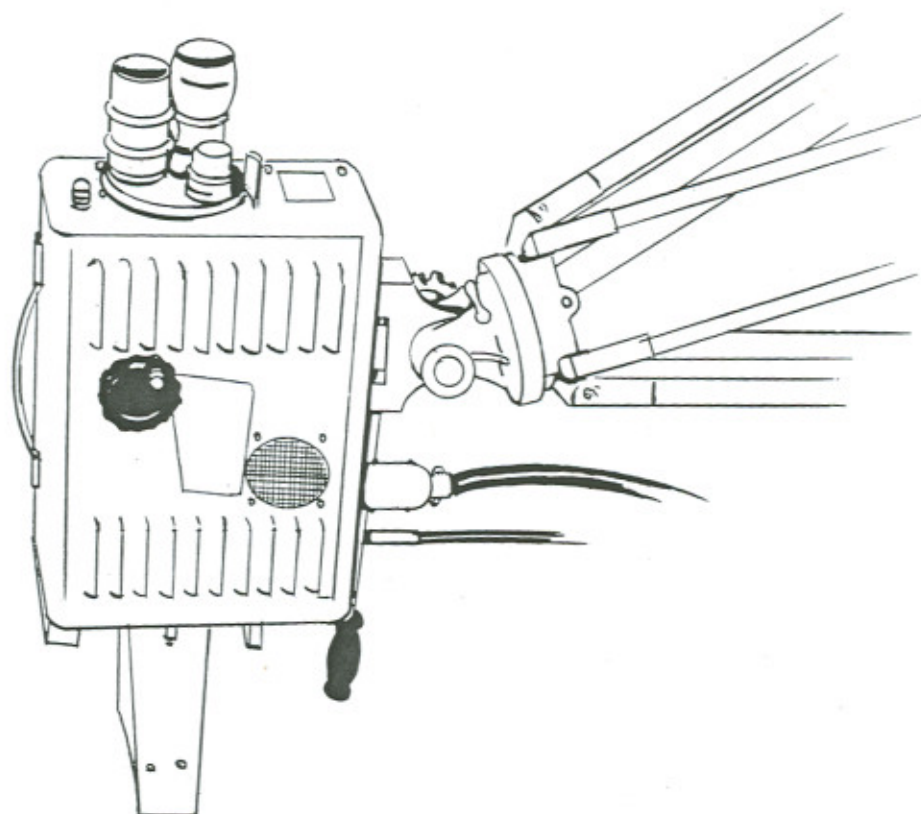


Diagram N

derstand these, as well as conditions under which certain lenses will operate, before selection is made for a particular shot.

Basic characteristics of television camera lenses are:

Focal length
Magnification
Depth of field

1. The focal length of a lens determines its field of view:

- a. Change lenses by rotating the lens turret, or
- b. Move camera in or away from the subject.

2. Magnification is a characteristic which is determined by the distance between the lens and the subject. Choosing the proper lens will materially affect the illusion of depth and perspective. For example, a wide-angle lens, such as a 1/2-inch or 1-inch, close to a person, will make his hands appear large and out of proportion to the rest of the picture when he gestures toward the camera. On the other hand, a telephoto lens, such as a 3-inch, will make objects in the background appear larger than they really are.

3. A third characteristic of television lenses is their depth of field. This is determined by the amount of light passing through the camera lens and is controlled, either by varying the distance between the lens and the subject, or by adjusting the lens opening. For this purpose, each lens has two different adjustments:

a. The f stop adjustment: This is usually a small, rotary ring around the barrel of the lens and connected to an iris diaphragm made of many small overlapping leaves. Moving the ring will increase or decrease the size of the opening in this diaphragm — the larger the opening, the smaller the f stop number, resulting in more light being transmitted through the lens; the smaller the opening, the higher the f stop number, resulting in less light passing through the lens. It is necessary to have the iris set so that sufficient light will be transmitted in order to give a good picture to the camera tube. With normal lighting levels for vidicon studio operation, an adjustment between f/2.5 and f/4 is usually satisfactory. If light is below normal, a larger opening will be required.

b. The optical focus adjustment: This is usually set on infinity for television camera operation and usually is not changed during a program. In cases where it is necessary to adjust the optical focus for a particular shot, the lens optical focus will then remain constant and focusing will be accomplished by moving the camera tube back and forward by means of the focusing knob on the side of the camera.

CHARACTERISTICS OF THE VIDICON CAMERA TUBE

There are several advantages in using this type of camera, not the least of which is its small size and light weight, as well as its lower initial and operating costs. These factors make it particularly suitable for portable or field installation at Armed Forces Television Stations.

While there are advantages in using the vidicon camera, there are also disadvantages. The vidicon picture appears somewhat flat and the light values must be higher than for other types of cameras. Normal studio lighting conditions will call for approximately two-hundred foot candles of light and a lens opening of f/5.6.

The spectral response of the vidicon camera tube is similar to that of the human eye and this response extends, somewhat, into the ultra violet and infra-red regions, but

with normal lighting this extended spectral response can be disregarded. The vidicon camera in a high-quality circuit is capable of producing all ten shades of the television gray scale. A somewhat wider range of contrast can be picked up and more than five-hundred lines of resolution is possible.

Another feature of the vidicon camera is its ease of operation. It will operate virtually unattended over a wide range of conditions. Where adequate and considerable amounts of light are available, such as from a projector, studio, or remote pick-up, it performs in a more than satisfactory manner.

The vidicon camera's low cost, small size, light weight, and freedom from "burn-in," make it a flexible instrument for field operations.

THE TELEVISION CAMERA CONTROLS

The camera controls and associated equipment will be located in the television control room. Each camera will have its separate control unit containing a monitor screen. Using a selector switch, this screen is used to observe the picture, its horizontal or vertical wave form, as it comes from the camera. The control unit also contains the controls and circuits necessary to maintain the picture quality while the camera is in use. In addition to the camera controls, there is a synchronizing generator which produces the pulse for locking the camera and receiver together.

By means of the video switcher, also located in the television control room, it is possible to switch the output of video sources into the program line. This is done with a series of push buttons which instantaneously cut from one signal to another or a dissolve unit. This dissolve unit permits fading in and fading out from one video source to another, or superimposing one picture on top of another image.

There are many other pieces of equipment which should be added to the television control room. These include a master monitor, an audio mixing panel, turntables, tape recorders and monitor speakers.

VISUALS FOR TELEVISION

The simplest and most common visual used in television is the title card. Many devices can be used for injecting the title card into a program, but the most reliable is also the simplest. These devices can be classified into the following two categories:

1. Devices which project an image directly into the television system, such as a slide, telop or motion picture projector.
2. Devices which project an image indirectly into the television, that is, by means of a studio camera.

No matter how visuals are introduced into the television system, the following standard of size, contrast ratio, and composition must be observed:

1. **Size**

Television transmits a picture in an aspect ratio of three to four. This means that all television pictures are three units high and four units wide and anything picked up and televised should be prepared in this proportion.

a. **Studio Title Cards:** Standard sizes of poster board divided evenly into rectangles of 11 x 14 inches are excellent for preparing studio title cards. This size allows an ample one-inch border for fingerprints and smudges, leaving a 9 x 12 working area for both artist and cameraman. But, as a safety measure, it is wise to mark off an

DIMENSIONS FOR STUDIO TITLE CARDS

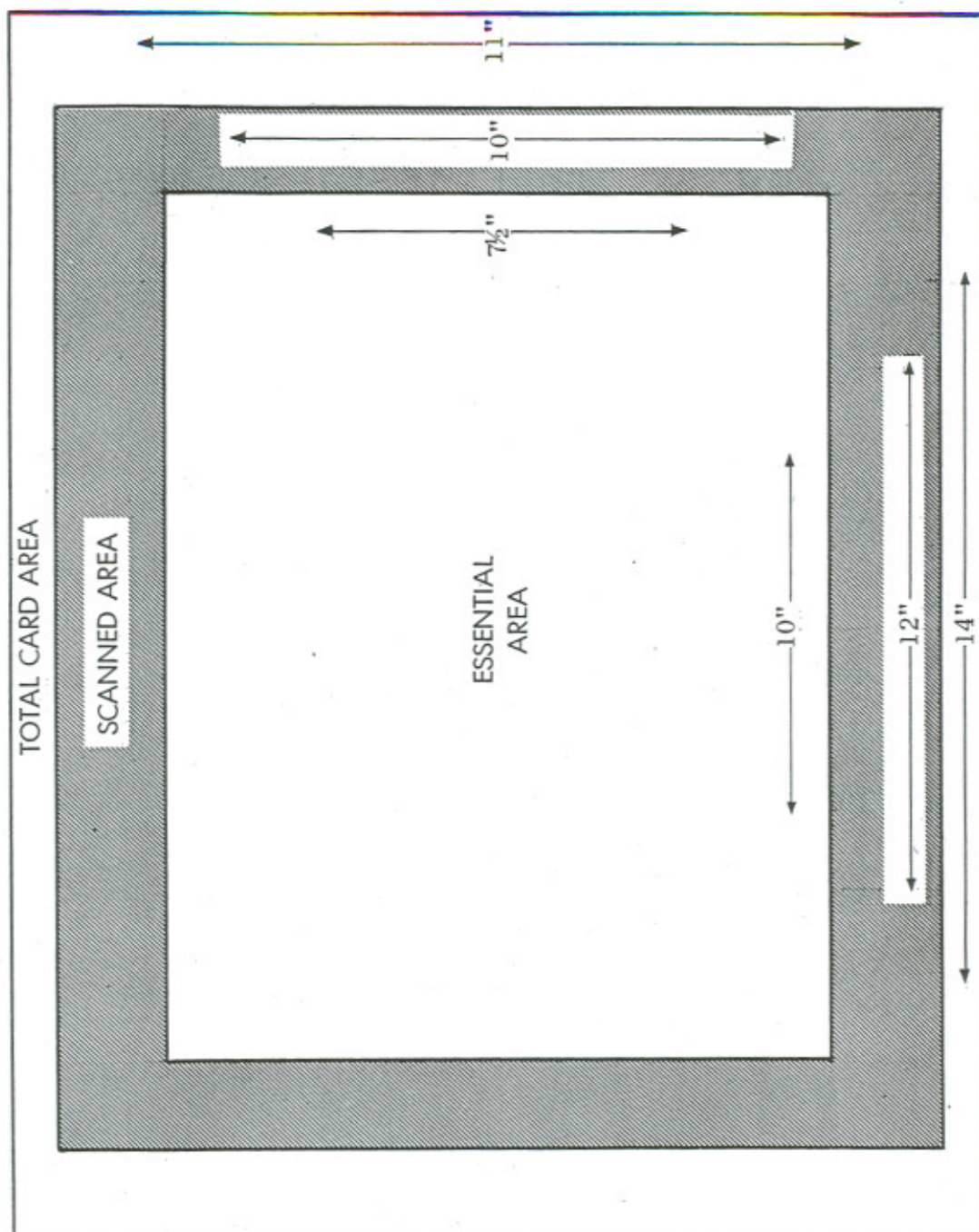


Diagram O

additional ten or fifteen percent inside this 9 x 12 inch area. This added precaution will reduce copy area to about 7-1/2 x 10 inches, but it will overcome overscanning, that is, loss at the edge of the picture, and will guarantee appearance of material in the essential area on a poorly adjusted receiver.

b. **Slides:** Copy for slides should be laid out so that the essential area will not be greater than 5/8 x 7/8 inches and it should be remembered that the total scanned area of the slide is 15/16 x 1-1/4 inches. Since slides are prepared by photographic process, the original material can actually be any size but the dimensions suggested for studio title cards will reduce to the proper slide dimensions, 2 x 2 inches, when photographed.

2. Contrast Ratio

Ordinarily, a ten-step scale of gray tones, varying within a twenty-to-one contrast range, can be used in the preparation of visuals for television. Step one, the lightest of the gray scales, is not pure white, but will appear pure white on the television screen. Step ten, in the same manner, is not jet black, but will appear black on the television screen. In theory, the television system is capable of reproducing all ten steps of the gray scale, but in practice this is difficult to accomplish. The ordinary receiver is not capable of differentiating between steps at the extreme light and dark ends of the gray scale.

It will be wise, therefore, for the artist to adopt a five-step range in the middle of the gray scale, including: an off-white, an off-black, and three in-between even steps of gray. By restricting his work to these five steps, the television artist will be assured that his work will transmit as he has drawn it. He should also remember, unless he is thoroughly experienced, to avoid using color in his visuals. Color lends contrast to the actual art work, but this contrast will be lost when seen through the television system. Finally, the television artist must separate his high contrast steps of the gray scale. It is not good practice to place areas appearing white and black adjacent to each other. These high contrast areas will bloom, streak or smear, since the television system cannot instantaneously react to wide changes in contrast levels. Jet black and pure white should never be used in the television visuals, except when preparing material for superimposition. In these instances, a white-lettered black card can be used when superimposing the lettering over a lighter scene. The off-white and off-black, however, will be better practice.

3. Composition

Certain standards of composition should be observed in the preparation of visuals for television:

a. Glossy inks or prints should never be used. A glossy black, while appearing black to the eye, may pick up a light reflection and transmit through the television system as a white, or near-white. The television camera is extremely sensitive to light reflections and a smooth, hard surface will reflect more light than a rough, dull surface. For this reason, matte, instead of glossy photographs, should be used.

b. The television visual must be simple in order to be understood from a distance. Simple line drawings will usually transmit better than detailed drawings or photographs of an actual object.

c. Tempera, or distemper paint, is the most effective for television scene painting. This is pigment mixed with a vehicle (such as yolk of eggs or glue) soluble

in water, as distinguished from oil painting. Models and properties executed in such materials will have a coarse, rough surface, excellent for transmission through the television system.

d. Lettering should be limited to about six lines, with a maximum of twenty-six characters to a line. There are many short cuts to television lettering, such as mechanical guides: the Le Roy lettering pen, the acetate templates, or the ready-made paper or plastic letters which the artist can lay out and cement to his art work. Some typewriters have over-size type, called bulletin type, which can be used for making small visuals. Almost any form of lettering device can produce a good television visual if proper contrast and layout are observed. A common fault with many television visuals is that the artist tries to include too much, thereby confusing the audience with the non-salient points of his message. This inclusion of too much information is referred to as a busy message. Extreme care must be exercised to insure that visuals are simple but, at the same time, tell a story.

STAGING FOR TELEVISION

In preparing studio backgrounds, the problems of contrast and layout are similar to those encountered in the preparation of studio visuals. For this reason, most commercial television stations combine the art and staging departments.

Before preparing the background for a program, it is necessary to know camera movement, whether the background will be seen in a close-up, and what type of action will take place in front of the background.

The background, as a general rule, should be darker than the foreground. A darker area tends to recede from the viewer, while a lighter area tends to stand out. This will give the appearance of greater separation between background and performer — always desirable for television transmission. If the background is not to be shown in a close-up, the lines and designs can be coarse, but if one area is to be seen close up, then more detail should be added to this particular area.

Lighting is also important in planning the television setting. The tone of the background can be adjusted by varying color, texture of material or intensity of light. All three of these characteristics will influence the reflective value of the back-drop, but in no case should the contrast range exceed the limits of the television system. Under normal lighting conditions, flesh tones will usually reproduce in the neighborhood of the third step of the ten-step gray scale, or the lightest gray in the five-step gray scale. Highly reflective objects should never be included on stage as a property, or as a part of a costume. If it is necessary to use a highly reflectant surface, it should be dulled with a special dulling spray. If a dulling spray is not readily available, soap can be used as a substitute, or a solution of Epsom salts and stale beer — one tablespoon of salts to one cup of stale beer. Spraying or brushing a shiny surface with this mixture will appreciably dull reflecting properties.

Many times, a visual will be seen in the same shot as the television performer. It should always be large enough to be read or at least recognized, usually 3 x 4 feet. Nothing will annoy a viewer more than a medium shot of a performer holding a small, unreadable visual. In cases where it is not possible to have a sufficiently large visual for the cover shot, it will be necessary to limit shots to close-ups. The visual in this case should not be included in a shot with the performer.

COSTUMING AND MAKE-UP FOR TELEVISION

For purposes of this Chapter, remarks relative to costuming and make-up will be re-

stricted to a few basic principles which can be applied to all costuming and make-up for television.

In general, extremely light or dark clothing, as well as material with highly reflectant qualities, should not be used. Fabrics with small busy prints or certain weaves should also be avoided inasmuch as they have a tendency to confuse the picture by interacting with scanning. The same can be said about tie clasps, pen clips, bracelets, broaches, and the like.

Make-up should be applied to the television performer for a clear, smooth skin tone. Special television make-up is preferred but, if it cannot be obtained, regular theatre make-up can be substituted. When applying either type of make-up, it must be remembered that television is a close-up medium and make-up must be applied and blended more smoothly than for normal stage work.

One must not be misled into believing that ordinary street make-up or a naturally flawless complexion will televise satisfactorily without stage or television make-up. A flawless, natural complexion, for example, will usually appear blotchy; a very light complexion will come through chalky white, while a dark complexion will give a swarthy, dirty look to the performer.

Besides giving a smooth appearance to the skin, make-up lightly applied to lips, eyebrows and eyelashes will give added definition to features, if their natural coloring does not come through the television system in sufficiently dark tones. If any doubt exists, a camera test before actual performance will always be helpful.

LIGHTING THE TELEVISION SETTING

Three basic factors are involved in the reflective value of a scene:

1. Material
2. Color
3. Illumination

Since it will be too late to change material or color, at the time a set is ready for lights, illumination, of necessity, should be considered as the most flexible of the above factors.

According to function, lights for a television set may be divided into the following five types:

1. Base Light
2. Set Light
3. Effects Light
4. Back Light
5. Key Light

A proper balance between these five types of lights is essential for transmitting an effective television picture. While reading the following descriptive explanation on these various lights, it will be helpful to consult Lighting Diagram "P" on page 92.

The Base Light: This is an even bath of light over the entire set. Its principal function is the filling in of shadow detail. The key light will be the principal source of light, but the base light will be used to balance this hard light. Base light usually comes from a highly diffused source. Scoops with spun glass diffusers are generally used to give this light. A properly diffused scoop gives virtually shadowless light, uniform-

ly distributed over a large area. Sometimes the base light is referred to as fill light or front light. The base light instruments are normally mounted relatively high over the scene and angled toward the floor in order to reduce the amount of light reaching the background setting. The base lights should be so arranged as to cover the entire scene with an even light. A single row of scoops, approximately ten feet from the front edge of the playing area, will be sufficient for this base light.

The Set Light: These are the special lights arranged to illuminate the various parts of the setting. At times it may be impossible to keep the key light and base light from falling on the set but, wherever possible, the setting should be lit separately from the other parts of the scene. Set light is seldom a constant intensity throughout the scene. The upper portions of the setting are usually darker than the bottom. The set light should also be of a lower intensity than the light on the performers, since a dark background tends to recede from the scene, thereby improving the appearance of the performers in the foreground. For special dramatic effects, it may be desirable to place the set lights so that darker portions of the set will appear behind light objects in the foreground, or so that dark objects are in front of a pool of light. On occasion, effective and interesting patterns can be created by breaking up the set light with shadows from silhouettes of wood, metal, cardboard, or such real objects as tree branches. Set lights should not be over-used in washing out unwanted shadows from such items as microphone booms. The usual result will be a set with too much light.

The Effects Light: Most settings will not need many effects lights, since these are arranged to give a special dramatic effect. Lights coming through windows, doors, or used to highlight a specific area or object, will be dictated by the script or setting. An eye light, a specific type of effects light, will be used to add sparkle to a performer's eyes. This is a small fresnel spotlight, mounted on the top front of the camera. It is small enough so that it will not materially affect the intensity of the light on a scene. This eye light is also used to light small objects in dark corners.

The Back Light: Properly used, the back light is the main contributing factor to the illusion of a third dimension in television. This light comes from behind the performer, focused on the head and shoulders in order to separate his image from the background. Back lights are normally equipped with barn doors for the purpose of keeping light out of the camera lens and preventing spill-over on the backdrop. Fresnel spotlights are used, but they are smaller than those used for the key light. Back light should be arranged to come from as low an angle as possible so as not to get into the camera lens. In selecting and placing back lights, it should also be remembered that too strong a back light will throw an unnecessarily heavy head shadow on the performers chest. If this occurs, intensity should be reduced or the light relocated. Back light is not a natural light. It is used only to create the illusion of depth and for this reason light intensity should be kept as low as practical.

The Key Light: This is probably the most important light in television and forms the principal light for the camera operation. On an average scene, it will be located above and slightly to one side of the camera. It usually is a fresnel type spotlight, with wattage and size dependent on the throw and the spread needed. With most key lights, two-way or four-way barn doors are used to shield the key light from undesired parts of the set. They are also used to keep light from interfering with special lighting from other areas and mask microphone boom shadows on the backdrop. If it is necessary to have two or more key lights in a scene, it should be remembered that each key should be so arranged as not to overlap. This is accomplished by adjusting the barn doors on each key light.

LIGHTING

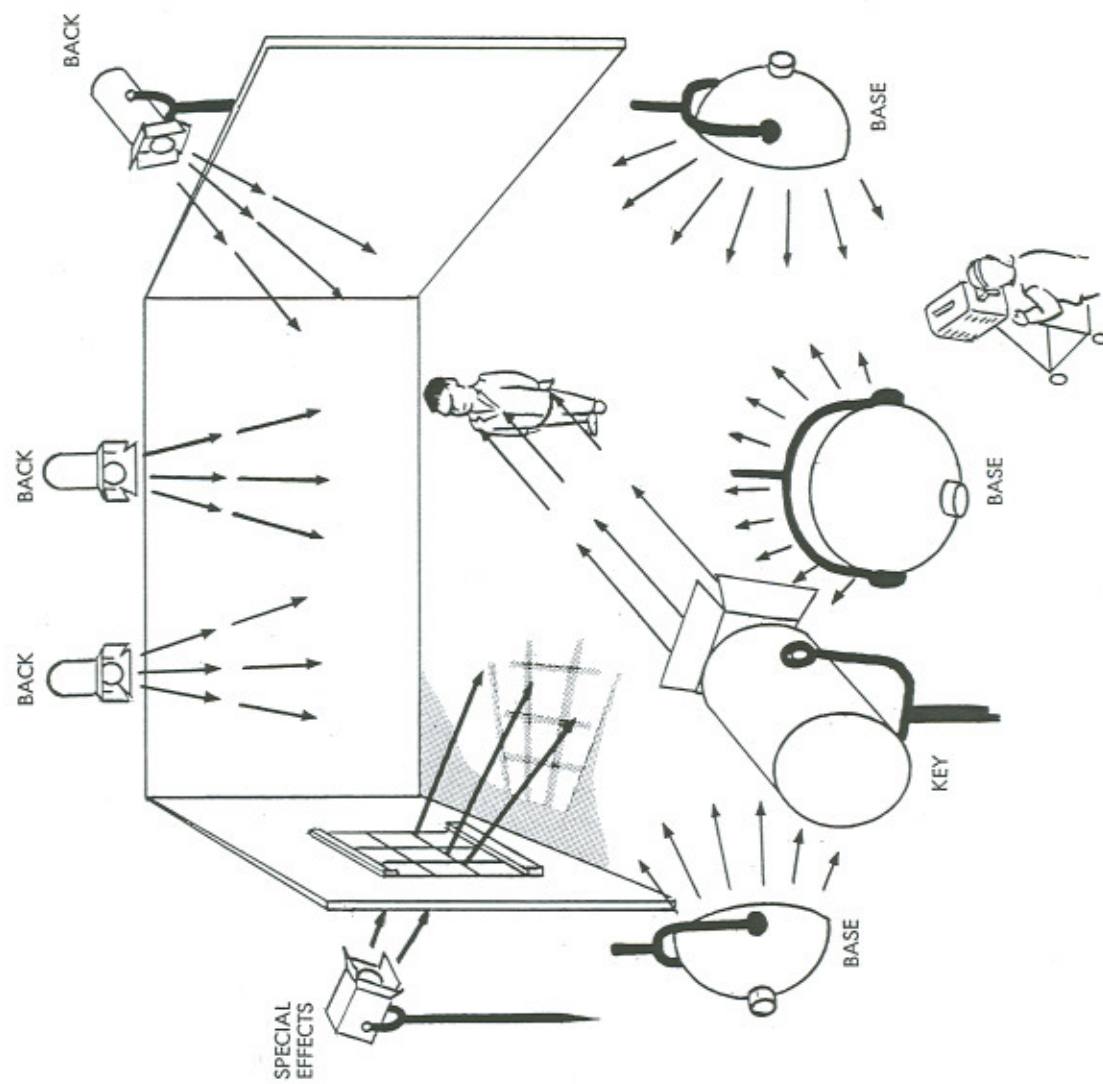


Diagram P

SEQUENCE IN LIGHTING THE TELEVISION SETTING

Under normal conditions it will be good practice to light the television setting according to the following sequence:

1. Key Light
2. Back Light
3. Base Light
4. Set Light
5. Effects Light

It is best to start with the key lights. After these have been set, intensity adjusted, barn doors arranged to restrict the light to the playing area, the other lights can be added.

The back light is usually the next one to be adjusted. Since a television set may extend over a considerable area, it may be necessary to set up several different back lights. If a camera is going to move into the setting and shoot from several directions, these back lights will have to be carefully adjusted so as not to reflect into the camera lens.

After the key light and back light are set, the base light should be added. It should be remembered that the base light is used to fill in shadow detail. Need and intensity can be determined by looking through the television camera while the base light is being set.

The set and effects lights are added last. These are primarily added to correct the deficiencies of the key, back and base lights, but they should not be added to basically bad light. The problem of bad lighting can usually be corrected by adjusting or re-locating the key, back or base lights.

THE MICROPHONE IN TELEVISION

Television is a visual medium, but this fact should not reduce the importance of audio.

There are several special problems involved in picking up the sound of a television program and the first of these is the source of the sound. In many television programs the source of the sound will be in motion and some form of moveable microphone will have to be used to follow this sound. This is usually accomplished with either the lavalier type of microphone attached to the performer or a regular microphone suspended from an extension boom.

Regardless of the type of microphone used, problems will be presented to the audio engineer. If the microphone is on an extension boom, the boom will have to be manipulated in order to keep the microphone in the proper pickup position. This will necessitate smooth coordination between camera, performer and the boom man. If the performer turns around while he is speaking, it will be necessary for the microphone to travel a considerable distance in order to get back into the proper pickup position. With the lavalier type of microphone it will be relatively easy to follow sound because it is attached to the performer, but there will be the problem of the trailing microphone cable. The performer will always be conscious of this hindrance and if he walks around a table in a clockwise motion he will have to remember to return in the opposite direction.

This leads to a consideration of a second problem with television audio. It will be desirable, in most cases, to keep the microphone hidden and the best way to do this is to

suspend it from a boom over the performer's head. This will cause problems with incidental microphone boom shadows, but if sufficient time for rehearsals is allowed, these shadows can be eliminated with proper lighting. Another problem facing the audio engineer will be the noise present in the studio. If a boom microphone is used approximately three to five feet from the actor, noise created by his clothing, movement of cameras, scuffling of feet, will be picked up, as well as his voice. The audio engineer will have to employ extra precautions in order to keep these extraneous noises to an absolute minimum. Under the best of circumstances, audio will be difficult. Each program will have its own special set of problems. Each problem will have to be worked out with the material at hand, the personnel, and the time available.